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PATENT ABSTRACTS OF JAPAN

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(54) LOW-CALORIE DRINK COMPOSITION

(57)Abstract:
PURPOSE: To obtain a readily drinkable low calorie composition not showing a bad aftertaste resulting from addition of inorganic electrolyte while exhibiting excellent taste, containing an inorganic electrolyte component and an organic acid component, by blending stevia extract as a sweet component with inorganic electrolytic cation in a given ratio.
CONSTITUTION: A low-calorie drink composition containing an inorganic electrolyte component (e.g. NaCl or KCl) and an organic acid component (e.g. sodium citrate or sodium lactate) is blended with a stevia extract as a sweet component in the following ratio. Namely, the amount of the stevia extract blended is 2-15mg based on mEq/l inorganic electrolytic cation in the component. Consequently, a bad aftertaste such as bitterness, harshness and astringency resulting from inorganic electrolytic cation can be eliminated at once to give a readily drinkable composition having good taste. The component can maintain a good taste for a long period of time without exerting a bad influence on taste stability.

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⑤4発明の名称　低カロリー飲料組成物

⑳特　願　平2−50414
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明　細　書

発明の名称　低カロリー飲料組成物

特許請求の範囲

① 無機電解質成分と有機酸成分とを含有する低カロリー飲料組成物に於て、甘味成分としてステビア抽出物を無機電解質陽イオンのｍＥｑ／ℓ当り２～１５㎎の割合で配合したことを特徴とする低カロリー飲料組成物。

② ステビア抽出物がリバウデイサイドＡである請求項①記載の飲料組成物。

③ １６０～３００（Ｏｓｍｏｌ）の浸透圧を有する請求項①記載の飲料組成物。

発明の詳細な説明

本発明は低カロリー飲料組成物、更に詳しくは無機電解質成分と有機酸成分とを含有する低カロリー飲料組成物に関する。

スポーツ等により発汗して失われた水分、電解質を補給する為の飲料組成物として低カロリースポーツドリンクが知られている。此種低カロリー飲料組成物は発汗により流出するＮａ、Ｋ、Ｍｇ、Ｃａ等の陽イオン及びＣℓ⁻や燐酸イオン等の陰イオンを補給する為に無機電解質又は無機及び有機電解質を含有している。然るに失われた陽イオン及び／又は陰イオンを補給するのに必要な量の無機電解質を配合すると、飲料に苦み、あく味、しぶ味等の好ましくない味が生じ飲料後の後味が悪くなる。斯かる好ましくない後味をなくするために甘味料が配合される。味の面からは砂糖等の天然糖質成分が最も好ましい甘味料であるが、その量が増えるとカロリーが大となり過ぎる。従って通常砂糖等の糖分と共に合成甘味料を添加し、カロリーをおさえ低カロリー飲料組成物とすることが行われている。

然るに従来使用されている合成甘味料はアスパルテーム、サッカリン等であるが、これらは天然糖質成分に比して甘味呈味の質が劣り、しかもこ

れらを添加すると飲料の呈味安定性が悪くなり数ケ月で呈味が低下してしまう。加えて合成甘味料の有する上記欠点の故に、天然糖質成分の量を充分に減少せしめ得ず、或る量以上の糖分を添加せざるを得ない現状にある。その為に飲料自身のカロリーを若者の要求に応じる程充分に低下せしめ得ず、また糖分による浸透圧上昇の問題も避け得ず浸透圧を吸収性に対し最も好適とされる１６０～３００（Ｏｓｍｏｌ）程度とし難い傾向がある。

本発明は、上記問題を解消し、無機電解質配合に基づく悪い後味を有さず、良好なる飲料し易い風味を有ししかも呈味安定性を阻害せず長期に亘って良好な味を保持し得る低カロリー飲料組成物を提供することを目的とする。また本発明は天然糖質成分の配合を不要乃至充分に少くし低カロリーで且つ吸収性のよい適度の低い浸透圧を有する低カロリー飲料組成物を提供することを目的とする。

即ち本発明は無機電解質成分と有機酸成分とを含有する低カロリー飲料組成物に於て、甘味成分としてステビア抽出物を無機電解質陽イオンのｍＥｑ／ℓ当り２～１５㎎の割合で配合したことを特徴とする低カロリー飲料組成物に係るものである。

本発明者の研究によれば、甘味料としてステビア抽出物を無機電解質陽イオンのｍＥｑ／ℓ当り２～１５㎎の範囲で配合することにより、無機電解質陽イオンに基づく苦み、あく味、渋味等の悪い後味を一挙に解消でき呈味良好な飲料し易い組成物を得ることができ、しかも組成物の呈味安定性に悪影響を与えることなく長期に亘って良好な呈味を保持し得ることが見出された。また本発明によれば天然糖質成分の使用を皆無若しくは大巾に減少させることができ、従って飲料組成物のカロリーを充分に低くできると共に浸透圧を吸収性良好な１６０～３００（Ｏｓｍｏｌ）の範囲とできる。

本発明低カロリー飲料組成物に配合される無機電解質成分は、発汗により失われる無機電解質陽イオン及び陰イオンを補給するために配合されるが、無機電解質単独のみならず無機電解質と共に有機電解質の形態でも配合される。無機電解質成分としては、従来此種組成物に用いられてきた各種無機電解質を使用できる。例えばＮａＣℓ、ＫＣℓ、ＭｇＣℓ$_2$、ＭｇＣＯ$_3$、ＣａＣℓ$_2$、ＣａＳＯ$_4$、Ｎａ$_2$ＳＯ$_4$、Ｋ$_3$ＰＯ$_4$、Ｃａ$_3$［ＰＯ$_4$］$_2$、Ｋ$_2$ＨＰＯ$_4$、ＫＨ$_2$ＰＯ$_4$、ＣａＨＰＯ$_4$等のアルカリ金属又はアルカリ土類金属の各種無機酸の塩類を例示できる。これらは通常数種組合せて配合されるが、通常ナトリウム塩及びカリウム塩と共にマグネシウム塩及び／又はカルシウム塩が配合される。上記無機電解質成分は無機電解質陽イオンと共に、無機電解質陰イオンとしての塩素イオン、燐酸イオン等の補給を考慮して適当な無機酸の塩の形態で配合される。また無機電解質陽イオンは、無機電解質としてのみでなく有機酸塩の形態でも配合され得る。たとえばクエン酸、乳酸、Ｌ－グルタミン酸、コハク酸、アスパラギン酸、アルギン酸、リンゴ酸、グルコン酸等の各種有機酸塩の形態で配合される。具体的にはたとえばクエン酸ナトリウム、クエン酸カルシウム、乳酸ナトリウム、乳酸カルシウム、コハク酸ナトリウム、コハク酸二ナトリウム、Ｌ－グルタミン酸ナトリウム、アスパラギン酸ナトリウム、アスパラギン酸カルシウム、アルギン酸ナトリウム、リンゴ酸ナトリウム、グルコン酸カルシウム等を挙げることができる。

これら無機及び／又は有機電解質成分は発汗により失われる無機電解質陽イオン及び陰イオンを補給するに必要な量配合すればよい。配合量は此種飲料組成物の配合に従って広い範囲に亘り得るが、好ましい配合量は飲料組成物１０００㎖中無

機陽イオンとして１０～４０ｍＥｑ程度、より好ましくは２０～３０ｍＥｑ程度の範囲である。無機陰イオンとしては１０～２５ｍＥｑ程度配合すればよい。

本発明飲料組成物に用いられる有機酸成分は上記無機電解質成分の形態で及び／又は遊離の酸の形態で配合される。使用される有機酸としては前記有機電解質成分の項に述べたと同様の酸を例示できる。有機酸成分の配合量も特に限定されず、此種飲料組成物に通常配合されている割合で配合すれば良く、また必要に応じそれよりも多く或いは少く配合しても良い。通常飲料組成物１０００㎖中に１．３～２．５ｇとなる割合で配合するのが好ましい。

本発明に於ては上記無機電解質成分及び有機酸成分と共に甘味料としてステビア抽出物を配合することを必須とする。ステビア抽出物はキク科の多年性植物ステビアから抽出される甘味料で、それ自身公知であり、例えば特開昭５２－８３７３１号及び特公昭５８－５６６２８号に記されている。しかし斯かる甘味料を無機電解質成分を含有する低カロリー飲料組成物に配合した報告はなく、これが無機電解質成分に対し一定量配合されたとき、前記顕著な効果を発現することについては全く知られていない。本発明に於ては公知の各種ステビア抽出物を使用できるが、好ましいのはリバウデオサイドＡ、リバウデオサイドＢ、リバウデオサイドＣ、リバウデオサイドＤ、リバウデオサイドＥ及びグリコシルステビオサイドであり、これらの中でもリバウデオサイドＡが特に好ましい。本発明に於ては上記ステビア抽出物を前記無機電解質陽イオンのｍＥｑ／ℓ当り２～１５㎎配合することを不可欠とする。上記範囲内で配合することにより無機電解質陽イオンに基づく好ましくない後味を解消できる。特に好ましい配合量は無機電解質陽イオンのｍＥｑ／ℓ当り２．５～１０㎎の範囲である。

本発明に於ては上記ステビア抽出物の配合により天然糖質成分の使用を不要乃至は大巾に少くすることができ、これによりカロリーを充分に低くできまた浸透圧の好ましくない上昇を回避して容易に吸収性の良い浸透圧を有する飲料とできる。本発明組成物は１００㎖当り１２ｋｃａｌ以下特に好ましくは１０ｋｃａｌ以下の低カロリーとし、且つ浸透圧を１６０～３００（Ｏｓｍｏｌ）好ましくは２００～２７０（Ｏｓｍｏｌ）とするのがよい。本発明に於て糖質成分は組成物の上記カロリー及び浸透圧を考慮して適宜配合すればよい。通常飲料組成物１０００㎖当り３０ｇ以下好ましくは２７ｇ以下配合するのが好ましい。糖質成分としては此種組成物に通常用いられる砂糖、ぶどう糖、果糖等が用いられる。

本発明は飲料組成物には上記各成分の他、グレープフルーツ、リンゴ、オレンジ、レモン、パイナップル、バナナ、ナシ等の各種果汁（濃縮果汁）や更にはビタミン類、香味料、アミノ酸（たとえばグルタミン酸ナトリウム、グリシン、アラニン、アスパラギン酸ナトリウム等）、植物繊維（例えばポリデキストロース、ペクチン、キサンタンガム、アラビアガム、アルギン酸等）、呈味成分（たとえばグルタミン酸、イノシン酸等）やオリゴ糖等の各種成分の１種又は２種以上を必要に応じ配合できる。

以下に本発明の実施例を挙げて本発明をより詳細に説明する。

実施例１～６

下記第１表記載の配合により本発明組成物を調製した。また各実施例の配合には更に適宜香料及びビタミン類を配合した。各配合は水により全量を１０００㎖とした。

第　1　表

実施例 No.			1	2	3	4	5	6
陽イオン (mEq/l)	Na^+		21	15	21	15	8	27
	K^+		5	5	5	5	4	5
	Ca^{++}		1	1	1	2	1	1
	Mg^{++}		0.5	0.5	0.5	0.5	0.5	0.5
	計		27.5	21.5	27.5	22.5	13.5	33.5
陰イオン (mEq/l)	Cl^-		16.5	10.5	16.5	10.5	6.5	17.5
	citrate^{---}		10	10	8	10	4	11
	lactate$^-$		1	1	1	2	1	1
	tartarate^{--}		0	0	1	0	1	2
	malate^{--}		0	0	1	0	1	2
	計		27.5	21.5	27.5	22.5	13.5	33.5
レバウディオサイドA (mg/l)			80	75	83	73	70	85
糖分	果糖	(g/l)	20	18	17	16	15	22
	ブドウ糖	(g/l)	2	1	2	3	2	1
	白糖	(g/l)	4	5	5	6	4	4

×　　〃　0~2　　〃

本発明飲料は従来の甘味料に比べ、後味の良さと全体評価でも優れた甘味であることがわかる。

＜保存安定性試験＞

本発明飲料－１と比較飲料－１を３０℃下に３ケ月保存後、前記官能テストを行った結果を下記に示す。

第　3　表

	本発明飲料－1	比較飲料－1
にが味	○	△
しぶ味	○	△
後味の良さ	◎	×
甘味の良否	◎	△
全体評価	◎	△

本発明飲料は長期保存による味の変化が少く保存安定性に優れていることがわかる。

（以　上）

代理人　弁理士　三　枝　英　二

＜官能テスト＞

実施例１で得られた本発明飲料組成物（本発明飲料－１）と実施例１の本発明飲料のレバウディオサイドＡに代えアスパルテームを１２０㎎／１００㎖を加えた飲料（比較飲料－１）とを１０名のパネラーにより試飲比較した結果下記の表に示す結果が得られた。

第　2　表

	本発明飲料－1	比較飲料－1
にが味	○	○
しぶ味	○	○
後味の良さ	◎	△
甘味の良否	◎	○
全体評価	◎	○

◎　　10名中９名以上が　良とした場合

○　　〃　6~8　　〃

△　　〃　3~5　　〃

SHUSAKU YAMAMOTO

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Inventors: Akihisa Takaichi et al.
Applicant: Otsuka Pharmaceutical Co., Ltd.

SPECIFICATION

Title of the Invention

LOW-CALORIE BEVERAGE COMPOSITION

Claims

1. A low-calorie beverage composition comprising an inorganic electrolyte component and an organic acid component, which is characterized by containing a stevia extract as a sweetener in an amount of 2 to 15 mg per mEq/l of the inorganic electrolyte cation.

2. A beverage composition according to claim 1 wherein said stevia extract is rebaudioside A.

3. A beverage composition according to claim 1 which has an osmotic pressure of 160 to 300 (Osmol).

Detailed Description of the Invention

The present invention relates to a low-calorie beverage composition, and more particularly to a low-calorie beverage composition containing an inorganic electrolyte component and an organic acid component.

Low-calorie sports drinks are known as beverage compositions for making up for water and electrolyte lost by

sweating in sports and the like. These low-calorie beverage compositions contain an inorganic electrolyte, or inorganic and organic electrolytes, to compensate for the cations such as Na, K, Mg, Ca and the like and the anions such as Cl^- and phosphate ions, released by sweating. However, if the inorganic electrolyte is contained in an amount sufficient to compensate for the depleted cations and/or anions, the resulting beverage is given an undesirable taste such as a bitter taste, harsh taste, astringent taste or the like, and leaves a bad taste in one's mouth when taken. A sweetener is used to avoid such an undesirable aftertaste. While natural saccharides, e.g. sugar are the most preferred sweeteners in terms of taste, an excessive supply thereof results in an excess of calories. Therefore, a synthetic sweetener is usually used in conjunction with saccharide such as sugar or like to reduce the calorie content so that a low-calorie beverage composition is obtained.

Synthetic sweeteners heretofore used, for example, aspartame, saccharine, etc. are inferior in the quality of sweet taste to natural saccharides and addition thereof impair the taste stability of the beverage, deteriorating the taste thereof in a few months. Moreover, because of the foregoing drawback of synthetic sweeteners, the amount of natural saccharide can not be sufficiently reduced, and the natural saccharide must be used currently in excess of a certain quantity. For this reason, the calories of a beverage can not be diminished to a level sufficient to meet the demands of youths, and the problem of osmotic pressure increasing due to the saccharide used can not be obviated so that difficulty tends to be entailed in keeping the osmotic pressure to about 160 to about 300 (Osmol) which is considered to be the optimum in view of absorbency.

An object of the present invention is to provide a low-calorie beverage composition free of the foregoing problems, the composition leaving no bad taste due to the inorganic electrolyte when taken and having a good flavor which facilitates drinking, and the composition being capable of retaining the good taste over a prolonged period of time without deteriorating the taste stability. Another object of the invention is to provide a low-calorie beverage composition which can eliminate the need to use a natural saccharide or can satisfactorily reduce the amount thereof so as to have a low calorie content and a properly low osmotic pressure at which a high absorption is attained.

According to the invention, there is provided a low-calorie beverage composition comprising an inorganic electrolyte component and an organic acid component, the composition being characterized by containing a stevia extract as a sweetener in an amount of 2 to 15 mg per mEq/l of inorganic electrolyte cation.

Our research revealed that when a stevia extract is used as a sweetener in an amount of 2 to 15 mg per mEq/l of inorganic electrolyte cation, the obtained beverage composition is entirely free of bad aftertaste such as bitter taste, astringent taste, harsh taste or the like due to the inorganic electrolyte cation and is palatable, easy to take and capable of retaining its good taste over a long period of time without adversely affecting taste stability. Moreover, according to the present invention, the use of natural saccharides can be eliminated or can be significantly decreased so that the calorie content of the composition is sufficiently lowered and that the osmotic pressure of the composition can be in the range of 160 to 300 (Osmol) in which a high absorption is attained.

The inorganic electrolyte component is incorporated into the low-calorie beverage composition of the present invention to make up for inorganic electrolyte cations and anions depleted by sweating. The inorganic electrolyte component can be incorporated not only as just an inorganic electrolyte but also as a combination of inorganic electrolyte and organic electrolyte. The inorganic electrolyte component can be any of various inorganic electrolytes heretofore used for this kind of composition. Examples of such conventional inorganic electrolytes are salts of inorganic acids with alkali metals or alkaline-earth metals such as NaCl, KCl, $MgCl_2$, $MgCO_3$, $CaCl_2$, $CaSO_4$, Na_2SO_4, K_3PO_4, $Ca_3[PO_4]_2$, K_2HPO_4, KH_2PO_4, $CaHPO_4$, etc. These salts are usually used in combination, and usually a sodium salt and a potassium salt are used in combination with a magnesium salt and/or a calcium salt. The foregoing inorganic electrolyte components are used in the form of suitable salts of inorganic acids in view of supplementation of chlorine ions, phosphate ions and the like as inorganic electrolyte anions together with inorganic electrolyte cations. The inorganic electrolyte cations can be provided not only as inorganic electrolytes but also in the form of a salt of organic acid. Examples of useful salts of organic acids are salts of citric acid, lactic acid, L-glutamic acid, succinic acid, aspartic acid, alginic acid, malic acid, gluconic acid, etc. More specific examples are sodium citrate, calcium citrate, sodium lactate, calcium lactate, sodium succinate, disodium succinate, sodium L-glutamate, sodium aspartate, calcium aspartate, sodium alginate, sodium malate, calcium gluconate, etc.

The inorganic and/or organic electrolyte component is used in an amount sufficient to make up for inorganic electrolyte cations and anions lost by sweating. The amount of

such component to be used is variable over a wide range which corresponds to the range for this kind of beverage composition. A suitable amount is, per 1000 ml of the beverage composition, preferably about 10 to about 40 mEq, more preferably about 20 to about 30 mEq in terms of inorganic cation, or about 10 to about 25 mEq in terms of inorganic anion.

The organic acid component in the beverage composition of the invention can be used in the form of the foregoing inorganic electrolyte component and/or a free acid. Examples of organic acids used include the acids exemplified above for the organic electrolyte component. The amount of the organic acid component used is not specifically limited, and may be in the range which is typical for this kind of beverage compositions, or may be less or more than the conventional range when so required. A preferred amount is 1.3 to 2.5 g per 1000 ml of the beverage composition.

It is essential in the invention to use a stevia extract as a sweetener, along with the inorganic electrolyte component and the organic acid component. The stevia extract is a sweetener extracted from a stevia, i.e. a perennial plant which is a genus of Compositae family. This extract is known per se, as disclosed e.g. in Japanese Laid-Open Publication No. 52-83731 and Japanese Publication for Opposition No. 58-56628. However, no report has been made on the incorporation of such sweetener in a low-calorie beverage composition containing an inorganic electrolyte component. It is entirely unknown that the foregoing remarkable effect can be achieved by using the above sweetener in an amount with respect to the inorganic electrolyte component. A variety of known stevia extracts can be used in the invention. Preferred stevia extracts include, for example, rebaudioside A,

rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside E and glycosylstevioside. Among these extracts, rebaudioside A is particularly preferable. In the invention, the stevia extract is critically used in an amount of 2 to 15 mg per mEq/l of inorganic electrolyte cation. The stevia extract used in the above amount prevents the undesired aftertaste from occurring due to the inorganic electrolyte cation. A preferred amount is 2.5 to 10 mg per mEq/l of inorganic electrolyte cation.

The use of the stevia extract in the invention can eliminate the need to use the natural saccharide component or can reduce the amount thereof to a pronounced extent, whereby a satisfactory decrease of calorie content is induced and the undesired increase of osmotic pressure can be avoided so that a beverage composition can be easily imparted an osmotic pressure at which a high absorption is attained. It is suitable that the composition of the invention have a low calorie content, specifically 12 kcal or less, or preferably 10 kcal or less, per 100 ml and have an osmotic pressure of 160 to 300 (Osmol), preferably 200 to 270 (Osmol). In the present invention, the amount of the saccharide component to be used is suitably determined in consideration of the foregoing calorie and osmotic pressure, and is usually in the range of 30 g or less, preferably 27 g or less, per 1000 ml of the beverage composition. Examples of the saccharide component for use herein include those commonly used for this kind of compositions such as sugar, glucose, fructose, etc.

When required, the beverage composition of the invention may contain, in addition to the above components, one or two or more components selected from the group consisting of the juice (concentrated juice) of grapefruits, apples,

oranges, lemons, pineapples, bananas, pears and the like; vitamins, spices, amino acids (e.g. sodium glutaminate, glycine, alanine, sodium asparate, etc.), vegetable fibers (e.g. polydextrose, pectin, xanthan gum, gum arabic, alginic acid, etc.), seasonings (e.g. glutamic acid, inosinic acid, etc.), oligosaccharides, etc.

The present invention will be described below in more detail with reference to the following examples of the present invention.

Examples 1 to 6

Compositions of the present invention were prepared using the ingredients as shown below in Table 1 in the listed amounts. In each of the examples, a suitable amount of aromatics and vitamins is further used. The total amount of each of the mixtures is made to be 1000 ml by adding water.

TABLE 1

Example No.		1	2	3	4	5	6
Cation (mEq/l)	Na^+	21	15	21	15	8	27
	K^+	5	5	5	5	4	5
	Ca^{++}	1	1	1	2	1	1
	Mg^{++}	0.5	0.5	0.5	0.5	0.5	0.5
	計	27.5	21.5	27.5	22.5	13.5	33.5
Anion (mEq/l)	Cl^-	16.5	10.5	16.5	10.5	6.5	17.5
	citrate $^{---}$	10	10	8	10	4	11
	lactate $^-$	1	1	1	2	1	1
	tartarate $^{--}$	0	0	1	0	1	2
	malate $^{--}$	0	0	1	0	1	2
	Total	27.5	21.5	27.5	22.5	13.5	33.5
Rebaudioside A (mg/l)		80	75	83	73	70	85
Saccharide	Fructose (g/l)	20	18	17	16	15	22
	Dextrose (g/l)	2	1	2	3	2	1
	Sucrose (g/l)	4	5	5	6	4	4

Test for taste

The beverage composition of the present invention obtained in Example 1 (Beverage-1 of the invention) and a beverage (Comparison beverage-1) prepared in the same manner as in Example 1 with the exception of using 120 mg/1000 ml of aspartame in place of rebaudioside A were each given to 10 judges for comparison. The results are shown in a table below.

TABLE 2

	Beverage - 1 of the Invention	Comparison beverage - 1
Bitter taste	○	○
Astringent taste	○	○
After taste	◎	△
Quality of sweet taste	◎	○
Overall evaluation	◎	○

◎: Not less than 9 of the 10 judges rated the beverage as satisfactory.

○: Six to eight of the 10 judges rated the beverage as satisfactory.

△: Three to five of the 10 judges rated the beverage as satisfactory.

×: Not more than 2 of the 10 judges rated the beverage as satisfactory.

The above results show that the beverage of the present invention is outstanding in aftertaste and overall evaluation when compared with conventional sweeteners.

Test for storage stability

After the beverage-1 of the invention and the comparison beverage-1 were stored at 30°C for 3 months, the foregoing test for taste was carried out with the results shown below.

TABLE 3

	Beverage-1 of the invention	Comparison beverage-1
Bitter taste	○	△
Astringent taste	○	△
After taste	◎	×
Quality of sweet taste	◎	△
Overall evaluation	◎	△

The beverage of the present invention exhibited little change in its taste when stored for a prolonged period of time and is thus excellent in storage stability.